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Fee-for-service payments and consultation length in general practice

A work-leisure trade-off model for French GPs*

This article presents an adaptation of the labour supply model applied to the independent medical sector. First, we model simultaneous GP decisions on both the leisure time and the consultation length for two payment schemes: fixed fees and unregulated fees. The objective of this econometric study is to validate the theoretical prediction that doctors under unregulated-fees may make choices about the length of patient consultations independently of their personal leisure decision. Indeed, according to our empirical results, the bidirectional link between leisure choice and consultation length –verified with fixed-fees– does not hold any longer under unregulated fees. Our findings can be seen as a necessary but not sufficient condition to legitimise unregulated fees in general practice.

Keywords. *"Work-leisure trade-off", "Working time", "Consultation duration","General practitioners", "Simultaneous equations"*

JEL codes. *C13. C31. I11. J22. J30*

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Introduction

Planning the supply of ambulatory healthcare is a key component of the healthcare organisation in a country, both from the perspective of the well-being of the population and the perspective of public finances or health insurance. Independent ambulatory healthcare, which has been adopted by many countries for greater freedom of choice and higher quality in treatments, nevertheless comes at a cost. Public authorities can control fewer aspects of the system. In fact, three crucial parameters currently escape the control of the regulator: the location of the activity, the length of work, and the length of patient consultations, all of which have been associated with the quality of healthcare. The location and the geographic dimensions do not fall within the scope of this paper (see, for example, Scott, 2001[1]). One can however state that different kinds of incentives can be implemented to better control physicians when they establish their practices. This paper focuses on the two other aspects of control mentioned above: duration of work and duration of patient consultation, which both might be the most difficult issues to monitor for self-employed physicians.

Few studies have attempted to link the "duration of consultation" to the "total working-time", such as to test the relationship by which total working-time, which is an indicator of physician's availability, can influence the time devoted to individual patients. Economists have taken an occasional interest in the overall labour supply of doctors[2]. However, even in these studies, consultation length is often left aside, in our opinion, for two reasons:

-the scarcity of data allowing researchers to test for interaction among the length of consultation, patients' characteristics, and the physicians' socio-economic characteristics, e.g., income, prices, and other data necessary for defining the work/leisure trade-off;

-a "cultural bias" in labour economics, which means that investigators rarely consider labour supply outside a wage-based contract and so they rarely take into account the specificities of independent activities (for self-employed workers, e.g. lawyers, notaries,

[1] In other countries, such as Canada, financial incentives have already been introduced specifically with the aim to encourage doctors to set up practices in the regions of Quebec where there is a lack of doctors (Bolduc et al, 1996, Benarroch and Grant, 2004).

[2] The relevant papers in the field are: Sloan (1975), Noether (1986), Rizzo and Blumenthal (1994), Showalter and Thurston (1997), Thornton (1998). Thornton (1998) is close to our approach, inflating the role played by the consultation length as a way to adjust hourly earnings. Thornton demonstrates, within the context of self-employed GPs and specialists, that changes in earnings are followed by a negligible response in labour supply. We challenge this result for unregulated fees in France, studying also physician's response in consultation length.

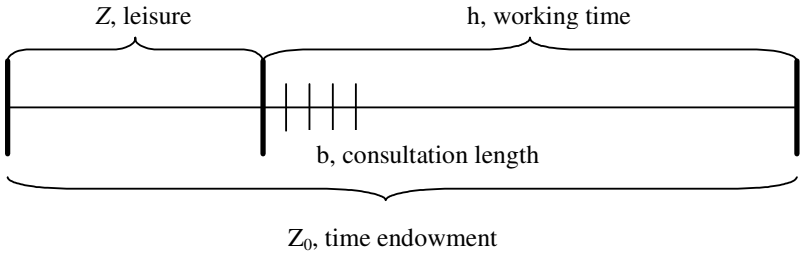
physicians) for which payment per hour cannot be computed from fees only, because, in fee-for-services, the time devoted to services may vary.

In this paper, we present a standard work/leisure trade-off model adapted to *independent medical activity*, which contrasts with contractual labour in the following characteristics: no flat-rate payments (a "fee" per consultation) and greater freedom in determining schedules (length of consultation), but a stricter and more direct set of medical and professional constraints concerning work activity and income (the patients are "customers"). Section 1 attempts to define the sets of constraints (economic and medical) to which independent doctors are subject when choosing their activity. This allows us to more accurately determine *the factors influencing the length of consultation* and *the rules of work-leisure trade-off* for this profession. Section 2 presents the French institutional perspective and data obtained from a sample of 1,901 general practitioners (GPs) working independently in 2006 in five French regions. The empirical study discusses theory, using the specificities of the French independent medical sector with two payment scheme sectors coexisting, unregulated *versus* fixed fees. The objective of the econometric study was to test whether doctors' choices are affected by the payment characteristics of the sector in which they operate. Section 3 presents the results of econometric modelling, which shows highly contrasting behaviour between doctors in "sector 1", limited by a fixed-fee system, i.e., fixed by an agreement between National Health Insurance and physicians' trade unions that allows patients to be reimbursed by the public health insurance, and doctors in "sector 2," where there is greater freedom for doctors to set their fees.

1. Supply of services by self-employed GPs

In this section we present a behavioural model for the supply of services by GPs according to the characteristics of their environment. The choice of the doctor is illustrated in the framework of the neo-classical theory of the labour supply, taking into account that independent doctors take two decisions: total working time and consultation rates. The dual dimension of these choices is illustrated in Figure 1. The time endowment Z_0 is divided into two traditional components: leisure and working-time. However, contrary to standard labour economics, the latter is not "homogeneous" and it depends on the choice of consultation length. A given working-time can therefore be calculated from multiple combinations of consultations of different length.

Figure 1. Work/leisure tradeoff and free distribution of consultations



1.1. Choice of activity in the case of an ambulatory general practitioner

In the context of labour supply theory, the doctor's aim is to obtain an income from his/her work that enables her to finance all or part of her consumption (his/her standard of living). Formally, the physician's choice can be expressed as follows:

$$\max_{C,Z,w} U(C,Z) \quad sc \begin{cases} C = wn \\ Z = Z_0 - nb \\ b \geq \bar{b} \\ n \leq d(w,b) \end{cases} \tag{1}$$

The objective function traditionally adopted is a utility function $U(C,Z)$ integrating the consumption of a generic good, C, and leisure, Z (Thornton and Eakin (1998)). Leisure is defined as the amount of time available once the medical activity is completed. The doctor has a fixed time endowment, Z_0, which he/she is free to distribute between leisure, Z, and the total time of her medical activity. Each consultation has a random length $\tilde{b}$ with average length denoted $b = E[\tilde{b}]$. The GP undertakes a number of consultations, n.

The price of the consumer good is fixed to unity, and the price of each consultation is expressed by w. In programme 1, physicians are confronted with a number of constraints:

- a budget constraint regarding the purchase of consumer goods;
- a time constraint distributing the time available between work and leisure;
- a constraint on the minimum quality of healthcare provided with a minimum threshold for the length of consultation (noted as $\bar{b}$). This constraint may be based on respect for professional standards or institutional rules, patient demands, or even social behavioural rules;

- a market constraint, since the supply of independent healthcare services must match patients' demand.

Since 1971, registration and licensing in France are based on a quota system called "*numerus clausus*": the number of students allowed to enrol in medical school is set each year by the government. Entry on the GP's market is then mainly controlled through education. The quota system in the University, associated with free choice of location, creates a monopolistic competition market for physicians' services and activity. Each doctor is therefore facing a finite demand in the locality where he/she is settled. We define the demand for GP's services *d(w,b)* as a function of the price of those services (fee per consultation) and the length of the consultation *(b)*. McGuire (2000) proposes a "net benefit function" for the patient that depends on the fee, the level of medical activity, and the level of quality provided by the physician. This net benefit function plays a role similar to our demand function. The patient is sensitive to the price of medical activities and to the level of quality supplied by the physician. In our model, we consider "quality" and "length of consultation" equivalent, an assumption already suggested by McGuire (2000) and confirmed by empirical studies (Freeman at al. (2002) for a review for Great-Britain). In short, this means that patients perceive the length of consultation as a measure of quality.

For medical labour supply, the message of this model is that the "cost of quality" is defined by the value of the time spent in each consultation in terms of leisure losses. Doctors not only have to decide their total working-time, but also to fine-tune a partition of total working-time between quantity and quality. The final choice regarding *Z* (total time) and *b* (length of consultation) will be a complex trade-off defined at both the supply side (intrinsic preference for leisure) and the patient side (demand for quality).

The characteristics of the healthcare system also influence the possible choices of ambulatory medical activity. The model enables us to describe two simple situations. In the first case, the price of a consultation is centrally established and is the result, for example, of negotiations between unions and Health Insurance or is an arbitrary price fixed by the government. When the price of a consultation is set, the doctor can decide only the length of the consultation and the number of consultations undertaken. In the case of "deregulated fees", the doctor can adjust her prices above the minimum level established by the regulations. These two situations are studied successively to demonstrate the interaction between institutional and economic constraints and the preferences of the self-employed GP in choosing her activities.

1.2. Choice of activity and fixed price per consultation

For doctors subject to a fixed-price $\overline{w}$, the choice is based on the length of consultation b and the number of consultations n. In this context, the first-order Kuhn and Tucker conditions of programme (1) can be written as follows, maximising U in n and b:

$$\begin{cases} \overline{w}U_C - bU_Z + \lambda_2 = 0 \\ -nU_Z + \lambda_1 - \lambda_2 \partial d\left(\overline{w}, b\right)/\partial b = 0 \\ \lambda_1\left(b - \overline{b}\right) = 0 \\ \lambda_2\left(n - d\left(\overline{w}, b\right)\right) = 0 \end{cases} \tag{2}$$

with: $U_Z = \partial U\left(C, Z\right)/\partial Z,\ U_C = \partial U\left(C, Z\right)/\partial C$.

Several situations can be considered according to whether or not the constraints of minimum quality and local market equilibrium are bounded.[3] In this paper, all doctors questioned earned at least a part of their professional income from their self-employed activities and then did not choose total inactivity as being an optimum solution. The existence of large fixed costs linked to the independent activity of the doctor (length of schooling, fixed installation costs) is *a priori* sufficient to guarantee the existence of an internal solution to the labour supply problem. This situation occurs when physicians use consultation length to maximise patient satisfaction. In doing so, they have to attract demand and to balance the local market of medical consultations. In this case, the market constraint is bounded and the quality constraint is relaxed; in this way, the length of consultation offered is greater than the minimum fixed duration. This results in the system:

$$\begin{cases} U_Z / U_C = \left(\overline{w} / b\right)\left[\varepsilon_2 / \left(1 + \varepsilon_2\right)\right] \\ n = d\left(\overline{w}, b\right) \end{cases} \tag{3}$$

which determines both the length and the number of consultations realised by the doctor. Here, ε_2 represents the consultation length-elasticity of demand. The budget constraint and the time constraint provide the recursive definition of the level of consumption and the level of leisure achieved. This system of equations demonstrates that the choice of the consultation length is based both on physicians' preferences in terms of consumption and leisure and on the characteristics of the demand. Simple calculus shows that the marginal

[3] The list of inequality constraints is not exhaustive. A certain number of constraints were ignored as being non-pertinent for the analysis undertaken in this paper. This is particularly true for the constraint $Z \leq Z_0$, which is widely used in studies concerning participation on the labour market.

rate of substitution of consumption for leisure (U_Z / U_C) is equal to the "fee" $\bar{w}$, corrected by a factor $(1/b)\left[\varepsilon_2 / (1+\varepsilon_2)\right]$.

This former correction can be explained by the specificities of the fee-for-service activity. Indeed, in the context of the medical activity, the doctor controls the length of consultation. Therefore, the pertinent remuneration is not the payment of the service, $\bar{w}$, but rather the price per consultation time unit $\bar{w}/b$. The margins of adjustment are greater than for an "ordinary" employee due to the ability to fine-tune total work time in accordance with the length (given by *b*) and number of consultations accepted (given by elasticity ε_2).

1.3. Choice of activity and "deregulated" fees

The ability to adjust prices offers the doctor an additional opportunity to modify the demand on her services (in addition to the variable *b*). This situation occurs when the doctor is not subject to a fixed-price agreement, a payment scheme which concerns the most of GPs in France (see section 2). In this case, the first-order Kuhn and Tucker conditions of programme (1) can be expressed as follows, maximising *U* in *n*, *b* and *w*:

$$\begin{cases} wU_C - bU_Z + \lambda_2 = 0 \\ -nU_Z + \lambda_1 - \lambda_2 \partial d(w,b)/\partial b = 0 \\ nU_C - \lambda_2 \partial d(w,b)/\partial w = 0 \\ \lambda_1 (b - \bar{b}) = 0 \\ \lambda_2 (n - d(w,b)) = 0 \end{cases} \quad (5)$$

When doctors can choose the consultation price, the local market is automatically balanced (demand = supply for all $\lambda_2 \neq 0$)[4]. When the duration constraint is not bounded ($b > \bar{b}$), the choice of the quantity, length, and price of the consultations obeys:

$$\begin{cases} U_Z / U_C = (w/b)\left[\varepsilon_2 / (1+\varepsilon_2)\right] \\ U_Z / U_C = (w/b)\left[(1+\varepsilon_1)/\varepsilon_1\right] \\ n = d(w,b) \end{cases} \quad (6)$$

where ε_1 represents the price-elasticity of demand.

This can also be expressed by:

$$\begin{cases} U_Z / U_C = (w/b)\left[\varepsilon_2 / (1+\varepsilon_2)\right] \\ 1+\varepsilon_1+\varepsilon_2 = 0 \\ n = d(w,b) \end{cases} \quad (7)$$

with ε_1 denoting the elasticity of demand to the price. The physician thus chooses the length and the price of consultation according to the characteristics of the patients in order to balance "price effects" and "quality effect" in her demand $(1+\varepsilon_1+\varepsilon_2=0)$. The first two equations in (7) could be written as a mark-up over price $(w-e)/w = -1/\varepsilon_1$ and a mark-up over consultation cost $(w-e)/e = 1/\varepsilon_2$ with $e = b(U_Z/U_C)$. The doctor, acting according to the best interests of her consumption/leisure trade-off, has now a second variable for adjusting her market conditions: *w* is added to *b*. The first-order condition $1+\varepsilon_1+\varepsilon_2=0$ describes the terms of the trade-off between quality and price. In other words, the ability of the GP to regulate demand by price -instead of by length of consultation only- allows her to escape the situation in which he/she would have to decrease quality in order to gain leisure. In this way, creating a non-fixed-fees sector for independent GPs is expected to increase social well-being.

However, note that a "special case" occurs when the physician, although free to choose the price, decides to modulate only the length of consultation and to adopt the regulation price level $\overline{w}$ for her consultations. In this situation, the doctor deliberately chooses to position herself at $\overline{w}$ as a result of her preferences and economic constraints, without being linked to any institutional constraint. This corner solution to the lowest fee may correspond to a situation in which the elasticity of demand to price is so high (poor patients, for example) that it is not possible to maintain a substantive clientele (*n*) by any adjustment of the quality/price ratio (*b/p*). Carrère (1991) has already shown that doctors can choose this corner solution when working with poor clients.

Until now, our analysis has been carried out with the assumption that GPs faced a local market demand without any explicit competition between GPs. This simplifying assumption allowed us to focus precisely on GPs' personal characteristics through their individual utility functions. It is possible to extend the model to explicitly account for competition between GPs at the global market level. For the sake of simplicity, we assume that GPs are homogeneous except for their ability to set prices (sector 1 *versus* sector 2).

[4] The particular case of zero leisure (*Z*=0) is an exception. This specific case is not considered here. In the empirical section, the case is excluded, since the total work-time necessarily requires provision for rest time.

The regulator sets the number of GPs within each segment exogenously. Let b denote the quality of service provided by GPs who face fixed fees and b' denotes the quality of service provided by GPs who have the ability to choose the consultation fee w'. In such a framework it is straightforward to see that b will be solution of (3), and will serve as a quality constraint for GPs allowed to choose both consultation length b' and fee w'. Then, b', w' and $n'=d(w',b')$ will satisfy (7) with $b' \geq b$ as a minimum quality constraint.

At the global market level, the market for health services from GPs will therefore be segmented between the low quality b offered at the fixed price $\bar{w}$ and the high quality b' offered at a free price w'. One should note that we did not make the demand function homogeneous among segments. The model can allow for more specific demand functions, such as the one used by Pope (1989) or Mougeot and Naegelen (2005) where the number of consultations for each GP depends on her perception of the quality of several competing GPs and, in our model, from deviation from the reimbursed fee $\bar{w}$. As shown by Mougeot and Naegelen (2005), such a demand function is well suited to represent quality competition *à la* Cournot among health providers. Except for explicit functional forms and determinants of global supply of health services, introducing such a demand function does not modify the very nature of GPs behaviour, as described by (3), (7) and the conclusions of our model (function $d(b,w)$ "captures" the reactions of the clientele to GPs' offers in a market with imperfect competition).

1.4 Summary

In this section we developed a behavioural model for the supply of services by GPs according to the characteristics of their environment. Two settings were described: 1) a framework in which a regulator sets the price and lets the GP choose the consultation length of her activities; and 2) a framework in which the GP is free to choose both the consultation length and the corresponding fee. These two settings produce sharply contrasting predictions about a physician's behaviour because the ability to set the consultation fee allows her to disconnect leisure choice from consultation length choice. In the first framework, this separation does not apply, so consultation length is based both on market/demand conditions and on physicians' preferences. In the second framework, separation applies, so for a modified w, consultation length is only based on market/demand conditions. One should note here that consultation length in the first framework acts as a competitive constraint for a GP's behaviour in the second framework. This creates a direct incentive for GPs in sector 2 to increase consultation lengths when unregulated fees and fixed fees both apply in the market.

2. Institutional context and data

2.1 Institutional context

The framework prevailing in France for primary care is appealing for two main reasons. Fixed-fees and unregulated-fees billing schemes both exist at the same time, and potentially in the same place, for different GPs. In addition, there is no *ex ante* assignment of the clientele to the GPs (or to the billing sector). Patients are free to choose and change their GP. This situation (*ex ante* equal environment, except for the payment schemes), authorises the comparison in GPs' behaviour between sectors. It is therefore possible to relate part of the observed difference in specific reactions to payment systems, taking into account, for the empirical test, that the clientele may be systematically different in sector 1 and sector 2 at equilibrium.

In 1980, French physicians' unions obtained the creation of sector 2, which was presented as a way to bypass depreciation in the real-value of the regulated fee, during a period of high inflation. For GPs in sector 2, the counterpart of the free setting of fees was a specific tax system for their own social protection (more expensive). Free access to sector 2 has been closed since the early 1990s for GPs (although it remains open for specialists). Access then became very restrictive, conditioned by a specific licensing ("clinicat") that GPs do not generally pass. GPs who benefited from sector 2 before 1990 were allowed to continue benefiting from it. This temporal "window of opportunity" explains why GPs in sector 2 do differ from their colleagues in sector 1, essentially by age characteristics (the difference is statistically significant, p=0.0001). Carrere (1991) provides a comprehensive view of GPs choices during the period of 1980-1990. Although they were allowed to change, more than 80% of GPs decided to remain in sector 1, either because their clientele has limited capacity to pay extra prices (Carrere, 1991) or because they estimated that costs were offsetting benefits, considering their own characteristics (see table below).

Main characteristics of the French primary care system – self-employed physicians

	Sector 1	**Sector 2**
Payment scheme	Fee-for-service	Fee-for-service
Prices of medical services	Regulated prices, "prix conventionnés" fixed by an agreement between GPs and Health Insurance ("Assurance-Maladie")	Free pricing (fees higher than in sector 1); Cost for the GPs: greater personal social insurance contribution
Coverage and dates	Represents approximately 90% of GPs	Created in 1980; access closed in 1990
Reimbursement for the patients	Generally, 100% of the reference price. 70% by Public Insurance, 30% by complementary insurance	Generally, the extra price is paid with out-of-pocket money, but certain complementary insurance

	("mutuelle" or private insurers) if the patient has paid for it (90% of the population).	policies cover at least a part of the extra costs.

Knowing that it was impossible to study the very early selection effect for GP between sector 1 and sector 2 (made before 1990)[5], we choose to focus on clientele differences. Patients in sector 2 are richer and more educated (the extra price has to be paid). This could impact the level of the consultation length, regardless of price (Wiggers and Sanson-Ficher, 1997). However, we do not focus on consultation duration *per se*, on the relationship between consultation length and leisure choice, for both sectors. It is the first reason, in our view, why differences in clientele are not driving the results. Second, to control for clientele heterogeneity, we used different variables available for each GP including location, patient age-distribution, and, above all, the "percentage of patients eligible for free healthcare service programs for low-income people" (in average 7% of patients in sector 1 versus 5% in sector 2, p=0.001). This variable is frequently used as a proxy for deprivation level in France (Saliba and Ventelou, 2007; Gemmill and al. 2008).

2.2 Data

GPs sample is taken from a panel survey that has been set in March 2007 and that examines the medical practices of 1,901 GPs in five French regions: Normandy, Burgundy, Brittany, Loire and Provence. This panel was compiled from a joint initiative of the Ministry of Health, the National Federation of the Regional Health Observatories (ORS), and the Regional Unions of Self-employed Physicians (URML) in the regions concerned. In each region, the sample of GPs selected for this study is representative of the overall GPs' population. The sample was obtained by random stratified sampling with the strata defined by gender, age (under 45, 45-53, 54 and older in 2006) and location (urban, suburban, rural). GPs were selected in the exhaustive professional repertory of French GPs in activity (ADELI). Doctors planning to stop practising or to move out of the region, as well as those who practiced *exclusively* complementary or alternative medicines such as homeopathy and acupuncture were excluded. 3,354 GPs were initially contacted: 1,453 refused to participate in the survey-panel, 1,901 accepted. The process of selection of GPs ended when all strata were completed with a uniform sampling rate, which finally makes the sample representative (at least with respect to the criteria of stratification: age, gender, location).

[5] It was not possible to study GPs' choice of the billing sector, with the help of a selection equation in our econometric model. Indeed, since 1990, characteristics of GPs and of their clientele have substantially changed; it would be misleading to study the selection process with variables giving characteristics of GPs 20 years after the choice was made. The literature challenges this research question by using proxies based on characteristics of GPs, characteristics of the practices or their populations and their areas (Carrère 1991, Gravelle et Hahn 2006, Devlin and Sarma 2008).

The 1,453 GPs who refused to participate did not differ from participants according to practice location (p = 0.84) and gender (p = 0.22), but they were older (52.6 versus 51.7 years, $p < 10^{-3}$). Lack of time was the most frequent reason for refusal (54.5%). After that, due to missing data on several questions, 265 questionnaires (13.9%) were withdrawn from the following analyses for a final sample size of 1,636 GPs. These GPs did not differ from the other 1,901 initially included according to practice location (p=0.29), gender (p=0.18), age (p=0.11) and billing sector (p=0.18). Results presented in this paper are based on this panel of 1,636 GPs.

The first survey took place in March and April 2007. It collected data from GPs concerning activity levels, such as workload, list size, and number and type of consultations. This survey also included data from the Individual Receipt for Activities and Prescribings (RIAP), in which Health Insurance records all reimbursed spending for insured patients. The three variables of interest used in the present analysis were obtained as follows (see Table 1).

The variable "leisure time" (hours per week) is defined as the time remaining after subtracting the time each GP reported to have worked: $Z=Z_0-(n.b)$. More precisely, leisure time is calculated as seven times 24 hours (Z_0) minus the declared number of hours worked for a typical week, i.e. a week without any holiday. In this calculation, we nevertheless added the weekly leisure time corresponding to the declared number of weeks of holidays.

The variable "length of consultation" (b, in minutes) was calculated by dividing the time devoted to patients (total time worked in the independent practice, minus the time devoted to administrative tasks, medical training, and receiving medical representatives) by the number of consultations. The calculation takes into account a constant travel time for all house consultations, with a value of 10 minutes for GPs located in urban area, and 20 minutes for GPs located in rural area. We obtained an average rhythm of practice, which is not observed directly on a specific day, but rather reflects average rhythm of activity over the entire year.

The variable "price of consultation", w, is declared by each GP in sector 2 as the "usual fees demanded". Generally, GPs in sector 2 display their fees in the waiting room. Thus, we can hypothesize that GPs have declared this amount, although GPs can modulate their fees case by case, "with tact and moderation" as the Medical Council ("Ordre des médecins") describes. In sector 1, the fee for consultation was fixed at 21 euros in 2007 ($\overline{w}$).

The calculation of the three variables above is based on empirical data. These data have one disadvantage in that they are partially self-reported by physicians. On the other hand, the data provide information not available elsewhere, for example, data concerning unregulated

fees, income, or *total* work time, which includes "non-medical tasks" such as administrative work, waiting and reception times of patients, reading and research time, and self-training.

Other information that could lead to an occasional increase in the price or length of consultations was not available in the database. For example, information was unavailable on the number of consultations giving specific extra fees (week-end, public holiday, night, emergency, on-call), their content (type of pathology, technical or surgical intervention undertaken during the consultation), and the reason for the consultation (first consultation at the request of the patient, or follow-up consultation to monitor a previously identified pathology). Nevertheless, we can control our econometric regressions, which are specified using averaged variables for each GP, by global characterisation of their patient-list: % of patients between two given ages, % of patients with free healthcare because of low income and % of patients exempted from payment because of long-term illness (see Tables 2-4).[6]

The average GPs' age was 52 for men and 47 for women. Just over half (55.5%) of the physicians worked in group practices, while 41.5% own their own practice.

Table 1. Descriptive statistics: consultation length, leisure time

Variable [expressed as mean (stand. error)]	**Billing sector 1 : "fixed fees" (n = 1519)**	**Billing sector 2 : "unregulated fees" (n = 117)**
Consultation length (minutes)	24.8 (10.7)	34.7 (18.4)
Leisure time per week (hours)	69.2 (12.7)	70.2 (11.6)
Average consultation fee (euros)	21 (-)	30.3 (9.3)

Note: Table 1 includes the 1,636 GPs for whom econometric analysis was possible (information for all variables was complete). From 1901 to 1636, half (144) of the 265 missing GPs could not be included in the final sample for technical reasons, (i.e. the impossibility of matching them with the database-system of the Health Insurance).

GPs reported an average weekly working-time, including time on call, of 56.6 hours. The weekly working time does not significantly differ between the two GPs groups that we defined for this study. The average consultation length for GPs, including the periods of inactivity between patients, was 25.6 minutes, with significant differences ($p < 0.0001$) based on gender (29.0 minutes for women compared to 24.5 minutes for men) and sector (24.9 minutes for sector 1 compared to 34.8 minutes for sector 2). The average price of consultation in sector 2 was 30.2 euros.

[6] Consultations undertaken outside the scope of reimbursed healthcare are not considered, e.g., telephone or free consultations.

3. Results

3.1 Lessons from the theoretical model for the estimation strategy

The theoretical model has shown two important points that allow us to better define the empirical study:

First, the set of constraints, as well as the results of the optimisation program, are clearly different between sector 1 and sector 2. It would be erroneous to pool the data and test a unique econometric model for the whole sample. There are in fact two patterns of choice depending on the sector of activity (fixed fees *versus* unregulated fees).

Second, the econometric model has to be estimated with a specification test for simultaneous equations system (two-stage least squares -2SLS- or three-stage least squares -3SLS-, against separate ordinary least squares -OLS- as a benchmark), because both the length of consultation and the total workload could be endogenous one to another[7]. The first-order conditions of the theoretical analysis demonstrate a *concomitant* determination of worked hours (or leisure time) and length of GP consultation, both as a function of the environment of the GP (i.e. patients' characteristics and the set of economic constraints linked to the sector of activity), and as a function of the personal GP's characteristics (psychological parameters concerning her taste for leisure or family constraints, any of which may affect her availability to work).

Subsequently, the econometric model was estimated, testing the potential endogeneity of the variables of interest (length of consultation, leisure time and fee in sector 2), separately for each sector of activity.

The objectives of the econometric study are two-fold. The first objective is to verify that doctors' choices are indeed affected by the "market characteristics" of the sector of activity in which they operate, and, in particular, to ascertain that GPs benefiting from deregulated fees (sector 2) adopt a different behaviour from the other GPs (sector 1). The second objective is to identify the direction of certain effects that remained ambiguous in the theoretical model, in particular the effects of the "price-sensitivity" of leisure time and length of consultations, both of which can be positive or negative depending on whether income effects or substitution effects dominate—as is the case in the microeconomics of the "backward-bending" labour supply curve. This is even more complex in the case of independent supply of medical services because, in addition to their total labour supply,

[7] Thornton and Eakin (1998) and Thornton (1998) defend a similar method. As we estimate the duration of consultation in an auxiliary equation (and the price per minute of medical activity), we

doctors may also adjust the consultation itself by increasing the number of shorter consultations. In sector 2, an additional level of ambiguity is observed since GPs set both the price and length of the consultations.

Estimations have all been made with Stata Statistical Software, release 10 (StataCorp).

3.2. Results (1): choice of model specification

Specification tests were grounded on the comparison between OLS (ordinary least squares) models, 2SLS and 3SLS models (two and three-stage least squares, based on instrumental variables) and SURE (seemingly unrelated regression equations) models. We used Durbin-Wu-Hausman statistics (DWH) as decision criterion (Davidson and MacKinnon, 1993, Nakamura and Nakamura, 1985). In sector 1, specification tests concerned two equations for each dependent variable: leisure time and consultation length. In sector 2, we added a third equation for the price of consultation (level of fees). All the other variables have been considered exogenous, i.e., uncorrelated to the error terms. For 2SLS and 3SLS models, the excluded instruments are described just below the tables giving the results of the estimation. Instruments were selected for their orthogonality with the error terms of the main predicted equation (their contribution to the explanation of one of three dependant variables was important, and was negligible for the two others). The Sargan test (Sargan, 1958) has been used for testing the quality of the instruments: the null-hypothesis is the joint assumption that the model is correctly specified and that instruments are valid. The presence of weak instruments has been tested by Anderson's "identification test" (Anderson, 1984, Hall et al, 1996). We also considered The Hansen and Kleibergen/Papp tests as alternative assessments for over/under identification problems. Both were always consistent. All the continuous variables were converted into logarithms, which enabled us to interpret the estimated coefficients as elasticities, while simultaneously reducing the heteroskedasticity of the model.[8] Results are given in Tables 2 and 3 for sector 1 and Table 4 for sector 2. In each Table, the model finally selected is in bold characters.

In sector 1, DWH tests comparing OLS and 2SLS models with instrumental variables show that 2SLS estimators are not more efficient than OLS estimators. We tested the effect of potential endogeneity of consultation length and leisure time in the model separately. P-values were 0.908 and 0.974, respectively. At the same time, the SURE specification, taking into account correlations between error terms of the two estimated equations,

escape the theoretical issue of non-linearity in the budget constraint. Note that we also tested the endogeneity of fees in sector 2.

[8] OLS models were estimated with robust standard errors. Available econometric software (e.g., Stata, SAS) do not allow for estimating 3SLS equations with robust standard errors.

dominated OLS modelling (specification test DWH, p = 0.000). Therefore, we selected this last specification for sector 1.

In sector 2, DWH tests for 2SLS models with instrumental variables showed that OLS estimators were dominated. When "length" was the dependent variable in the main equation, the p-values of the DWH tests for leisure and price were 0.047 and 0.892, respectively. When "leisure" was the dependent variable in the main equation, the p-values of the DWH tests for length and price were 0.605 and 0.533, respectively. When "price" was the dependent variable in the main equation, the p-values of the DWH tests for length and leisure were 0.033 and 0.295, respectively. Therefore, we decided to select a 3SLS specification to properly deal with potential multiple endogeneity of variables in the simultaneous equations system.

3.3. Results (2): comments on the estimates, increased flexibility in sector 2

First, doctors' behaviour, as estimated by separate models for sectors 1 and 2, revealed substantially different choices in time allocation: *i)* between leisure and working-time; and *ii)* regarding length of consultation. The econometric results illustrate the bidirectional sensitivity of leisure time with the length of consultation for GPs in sector 1 (Tables 2 and 3), whereas this is clearly not the case in sector 2 (Table 4). In sector 1, GPs seem to establish consultation length and leisure time choices concurrently, each of the two variables influencing the other in a negative manner. Leisure time determines consultation length ($\beta = -0.420$, $p < 0.01$) and the length of consultation influences leisure time ($\beta = -0.102$, $p < 0.01$). In other words, the more time a doctor can devote to each patient's consultation, the less time the doctor has for leisure, and vice versa. SURE specifications warranted that we not over-interpret the coefficients because of misleading correlations between the error terms in the two equations.

In contrast, Table 4 indicates a situation for sector 2 in which GPs seem to retain a certain degree of personal freedom in their time allocation decisions. These latter variables of interest showed no association with each other. The only variable of interest which can be explained in sector 2 by the two others is the fee, which showed a positive coefficient for consultation length ($\beta = 0.294$, $p<0.01$). In the present case, the estimated coefficient of 0.294 measures the "agreement" between the GP and the patient[9] that serves to *balance* the length of the consultation and the price paid. The consultation is longer but also more expensive.

[9] It is clear that this result, obtained in sector 2, documents a behaviour in which doctors are free to set their own price and the patients are free to accept the consultation (its length and its fee) always assuming that an alternative exists in the geographical zone of the patient, which, given the density of medical facilities in France, is quite realistic.

These results appear highly intuitive in light of the theoretical results obtained in section 1 of this article. GPs in sector 2 can compensate for the deleterious effects of a relatively high average consultation length on their leisure time by charging higher prices. The price is a variable of adjustment that substitutes for leisure time in sector 1. For an aged or seriously ill clientele, who has longer time consultations than other patients, GPs in sector 2 are for instance able to maintain a satisfactory personal income by increasing the price per consultation. In sector 1, this strategy is not possible and GPs suffer more from the "time constraints" imposed by the characteristics of their patients (or, in some other cases, by the characteristics of their own family). If they wish to maintain a high income, leisure time is the only variable of adjustment.

Conclusion

In this paper we investigated several dimensions of the labor supply problem of self-employed GPs. Only few studies examining self-employed practitioners have simultaneously analysed total working-time and the length of patient consultations. The rare available references concerning determinants of the length of consultation highlight medical factors: patients' characteristics, the prevalence of severe illness, and sometimes physicians' characteristics such as gender, age, and modalities of economic organisation (e.g. group practice versus solo)[10].

Taking into account the relationship between GPs leisure-choice and consultations length and using a panel of French GPs, we found the result that there exists a positive correlation between consultation length and unregulated fees, in the free-pricing sector in France. The result confirms the theoretical analysis and shows that indeed physicians translate a price increase into an improved "quality in service" (if we consider the situation in the most favourable terms possible, i.e. assuming that "quality in service" can be estimated from the average consultation length). It tends to legitimate unregulated-fees sector because it enables GPs to separate the need for treatment linked to their patients from their own time-use considerations and economic constraints. When GPs can equate each elementary consultation to an *ad hoc* price, the price per minute of the medical intervention can be held

[10] Martin *et al.* (1997) and Carr-Hill *et al.* (1998), for example, found that female doctors dealing with patients of the same sex hold the longest consultations. Deveugele *et al.* (2002) claimed that one-third of the variability in consultation length is due to doctors' characteristics and two-thirds are due to patients' ones. These authors used data comparing several series of consultations in different Western countries. Scott and Shiell (1997) reported similar results for Australia.

constant regardless of the length of the consultation. The economic neutrality of "patients in good health" and "seriously ill patients" is perfectly achieved.

As regards policy statements, we must concede that a limitation of our study is that we did not consider in our models (empirical and theoretical) the upstream choice by GPs to enter the primary care market and progressively select their types of the clientele. Another limitation is that we are not able to deal with intensive adjustments, consisting, for example, of replacing the most intensive and demanding interventions with more routine and easy consultations. Both effects are consistent with the view that the leisure needs of a GP are a key issue for the quality of care in general practice and that payment schemes (and levels of payment) could interact with quality through different behavioural adjustments. Further research will have to take these factors into account when evaluating, for example, the price-elasticity of the supply of a certain consultation length.

On the whole, these results strengthen the idea that the consultation length devoted to patients cannot be easily disconnected from a GPs' preferences (sector 1 comprises 90% of French GPs). The unregulated fees strategy is one possibility. However, it must be balanced with its cost, namely, an increase in fees and the likely consequence of a redistribution of welfare from patients to doctors. In this way, our results could be seen as a necessary, but clearly not sufficient, condition to legitimate unregulated fees in general practices.

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Table 2. Consultation length (log) – Sector 1

	OLS	**SURE**
Leisure time (log)	-0.212	**-0.420**
	(0.052)**	**(0.051)****
Intercept	4.994	**5.905**
	(0.258)**	**(0.256)****
GP's socio-familial characteristics		
Male	-0.159	**-0.176**
	(0.029)**	**(0.029)****
Age	-0.004	**-0.004**
	(0.002)*	**(0.002)***
Married	-0.162	**-0.159**
	(0.042)**	**(0.041)****
Spouse working	0.057	**0.056**
	(0.027)*	**(0.027)***
Desire to reduce working-time	-0.133	**-0.155**
	(0.024)**	**(0.024)****
Characteristics of the practice		
Group practice	-0.106	**-0.096**
	(0.024)**	**(0.024)****
Alternative medicine (occasionally)	0.076	**0.072**
	(0.034)*	**(0.034)***
% of consultations at home	-0.610	**-0.691**
	(0.140)**	**(0.139)****
Characteristics of the clientele		
% of patients with free healthcare because of low income (log)	-0.647	**-0.617**
	(0.171)**	**(0.170)****
% of patients between 0-16 years (log)	-1.617	**-1.674**
	(0.248)**	**(0.247)****
Number of observations	1519	**1519**
R^2	0.124	**0.114**
AIC	1555.775	**1440.788**
BIC	1678.253	**1563.267**

Standard errors in parentheses ; * significant at 5%; ** significant at 1%

	P-value
Test of over-identification of Sargan - 2SLS	0.689
Test of under-identification of Anderson - 2SLS	0.000
Test J of over-identification of Hansen - 2SLS robust	0.630
Test of under-identification of Kleibergen/Papp - 2SLS robust	0.000
Test of endogeneity of Durbin/Wu/Hausman for leisure – 2SLS	0.908
Hausman specification test (OLS vs SURE)	0.000

Instruments for leisure, P-values in univariate OLS models (sector 1)

	leisure	**length**
Rural zone	**0.000**	0.515
Offers free consultation (sometimes)	**0.031**	0.810
Additional diploma since doctorate	**0.013**	0.382

Table 3. Leisure time (log) – Sector 1

	OLS	SURE
Consultation length (log)	-0.052	**-0.102**
	(0.012)**	**(0.012)****
Intercept	4.629	**4.814**
	(0.056)**	**(0.056)****
GP's socio-familial characteristics		
Male	-0.086	**-0.096**
	(0.014)**	**(0.014)****
Desire to reduce working-time	-0.108	**-0.113**
	(0.011)**	**(0.011)****
Characteristics of the practice		
Group practice	0.043	**0.038**
	(0.012)**	**(0.012)****
Offers free consultation (sometimes)	-0.031	**-0.030**
	(0.014)*	**(0.014)***
% of consultations at home	-0.387	**-0.417**
	(0.068)**	**(0.068)****
Additional diploma since doctorate	-0.029	**-0.028**
	(0.011)*	**(0.011)***
Rural practice	-0.051	**-0.050**
	(0.013)**	**(0.013)****
Characteristics of the clientele		
% of patients between 0-16 years (log)	-0.277	**-0.355**
	(0.122)*	**(0.121)****
Number of observations	1519	**1519**
R^2	0.146	**0.137**
AIC	1554.508	**1438.978**
BIC	1671.676	**1556.145**

Standard errors in parenthesis; * significant at 5%; **significant at 1%

	P-value
Test of over-identification of Sargan - 2SLS	0.396
Test of under-identification of Anderson - 2SLS	0.000
Test J of over-identification of Hansen - 2SLS robust	0.405
Test of under-identification of Kleibergen/Papp - 2SLS robust	0.000
Test of endogeneity of Durbin/Wu/Hausman for length of consultation – 2SLS	0.714
Hausman specification test (OLS vs SURE)	0.000

Instruments for length, P-values in univariate OLS models (sector 1)

	leisure	length
Spouse working	0.147	**0.038**
Alternative medicine (occasionally)	0.655	**0.028**
% of patients with free healthcare because of low income	0.830	**0.000**
Age	0.513	**0.031**
Married	0.102	**0.000**

Table 4. Results OLS and 3SLS – Sector 2

	(1) Level of fees	(2) Consultation length	(3) Leisure time	**(1) Level of fees**	**(2) Consultation length**	**(3) Leisure time**
		OLS			**3SLS**	
Consultation length (log)	0.218		0.006	**0.294**		**0.076**
	(0.035)**		(0.036)	**(0.057)****		**(0.085)**
Leisure time (log)	0.044	-0.204		**-0.239**	**-1.023**	
	(0.102)	(0.218)		**(0.233)**	**(0.576)**	
Level of fees (log)		0.784	0.043		**0.557**	**-0.113**
		(0.172)**	(0.079)		**(0.396)**	**(0.196)**
Intercept	2.235	1.613	4.318	**3.180**	**6.094**	**4.592**
	(0.484)**	(1.131)	(0.248)**	**(1.032)****	**(3.046)***	**(0.460)****
GP's socio-familial characteristics						
Male	-0.058	-0.170	-0.046	**-0.054**	**-0.245**	**-0.043**
	(0.053)	(0.112)	(0.048)	**(0.057)**	**(0.131)**	**(0.049)**
Married			-0.181			**-0.192**
			(0.066)**			**(0.061)****
Working spouse			0.095			**0.097**
			(0.034)**			**(0.032)****
Desire to reduce working-time	-0.060		-0.072	**-0.084**		**-0.072**
	(0.036)		(0.032)*	**(0.036)***		**(0.031)***
Characteristics of the practice						
Group practice		-0.174			**-0.214**	
		(0.086)*			**(0.089)***	
Offers free consultations (sometimes)		-0.232	-0.079		**-0.285**	**-0.064**
		(0.090)*	(0.038)*		**(0.096)****	**(0.042)**
Alternative medicine (occasionally)		0.174			**0.217**	
		(0.085)*			**(0.084)****	
% of consultations at home		-0.967			**-1.467**	
		(0.442)*			**(0.567)****	
Internet connexion		0.638			**0.562**	
		(0.240)**			**(0.237)***	
Rural practice	-0.182			**-0.130**		
	(0.073)*			**(0.064)***		
Characteristics of the clientele						
% of patients exempted from payment[§] (log)			-1.332			**-1.464**
			(0.483)**			**(0.480)****
% of patients with free healthcare[&] (log)			1.910			**2.098**
			(0.691)**			**(0.647)****
% of patients between 0-16 years (log)		-1.287			**-1.400**	
		(0.589)*			**(0.612)***	
% of patients between 60-69 years (log)	4.096		1.646	**3.806**		**1.906**
	(0.844)**		(0.810)*	**(0.849)****		**(0.879)***
% of patients above 70 years (log)	-1.326			**-1.188**		
	(0.378)**			**(0.382)****		
Number of observations	117	117	117	**117**	**117**	**117**
R^2	0.520	0.541	0.241	**0.467**	**0.204**	**0.464**
AIC	-13.846	-13.846	-13.846	**36.870**	**36.870**	**36.870**
BIC	69.019	69.019	69.019	**45.996**	**45.996**	**45.996**

Standard errors in parenthesis; * significant at 5%; **significant at 1%

[§] because of long-term illness

[&] because of low income

Instruments, P-values in univariate OLS models (sector 2)

		Leisure time	Consultation Length	Level of fees
For leisure time	Spouse working	**0.006**	0.416	0.886
	Married	**0.007**	0.232	0.717
	% of patients exempted from payment because of long-term illness (log)	**0.006**	0.898	0.656
	% of patients with free healthcare because of low income (log)	**0.006**	0.868	0.417
For fees	Rural practice	0.803	0.168	**0.014**
	% of patients above 70 years (log)	0.662	0.619	**0.001**
For consultation length	% of consultations at home	0.511	**0.030**	0.162
	Group practice	0.872	**0.044**	0.193
	Internet connexion	0.342	**0.009**	0.269
	Alternative medicine (occasionally)	0.471	**0.042**	0.242